This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (withdrawn): In combination with a load lock apparatus for facilitating transfer of parts between a room at ambient atmospheric pressure and a vacuum processing chamber maintained at a pressure less than one torr, of the type wherein the load lock apparatus has an evacuatable load lock chamber, an exterior door positioned between the load lock chamber and the room, a interior door positioned between the load lock chamber and the processing chamber, a exterior door actuator that is responsive to an exterior door control signal to open or close the exterior door, an interior door actuator that is responsive to an interior door control signal to open or close the interior door, and a vacuum pump connected to the load lock chamber for evacuating the load lock chamber, the improvement which comprises:

a combination differential and absolute pressure transducer with (i) a manifold connected in fluid flow relation to the load lock chamber so that pressure in the manifold is equal to pressure in the load lock chamber, (ii) a differential pressure sensor that is capable of sensing a pressure difference between a first side of the differential pressure sensor and a second side of the differential pressure sensor, said differential pressure sensor being connected to the manifold and mounted such that said first side is exposed to the ambient atmospheric pressure in the room and such that the second side is exposed to the pressure in the manifold, (iii) a differential pressure transducer circuit connected to the differential pressure sensor and which is capable of generating an exterior door control signal at a preset differential pressure value, (iv) an absolute pressure sensor connected to the manifold in such a manner that the absolute pressure sensor is exposed to the pressure in the manifold, and (v) an absolute pressure transducer circuit connected to the absolute pressure sensor and which is capable of generating an interior door control signal at a preset absolute pressure value;

an exterior door control link connected between the differential pressure transducer circuit and the exterior door actuator, said exterior door control link being capable of delivering exterior door control signals generated by the differential pressure transducer circuit to the exterior door actuator; and

an interior door control link connected between the absolute pressure transducer circuit and the interior door actuator, said interior door control link being capable of delivering interior door control signals generated by the absolute pressure transducer circuit to the interior door actuator.

Claim 2 (withdrawn) The improvement of claim 1, wherein the absolute pressure sensor of the combination differential and absolute pressure transducer comprises a pirani sensor with a resistivity that varies as a function of the pressure in the manifold, and wherein the absolute pressure transducer circuit includes a pirani bridge circuit that incorporates the pirani sensor as a resistive element in the bridge circuit, an analog process circuit connected to the pirani bridge circuit to adjust voltage across the pirani sensor as the pressure in the manifold varies and thereby keep the bridge circuit in balance, and a relay control circuit that monitors voltage across the pirani sensor and generates the interior door control signal when the voltage across the pirani sensor is at a value that corresponds with said preset absolute pressure value.

Claim 3 (withdrawn) The improvement of claim 1, wherein the differential pressure sensor of the combination differential and absolute pressure transducer comprises a capacitance manometer pressure sensor in which a capacitance varies as a function of the differential pressure across a diaphragm that is positioned with the manifold pressure on one side of the diaphragm and ambient atmospheric pressure of the room on another side of the diaphragm, and wherein the differential pressure transducer circuit includes a sensor control circuit that is capable of converting the capacitance to a voltage that corresponds in value to the differential pressure across the diaphragm, and a relay control circuit that monitors the voltage from the sensor control circuit and generates the exterior door control signal when

the voltage of the sensor control circuit corresponds with said preset differential pressure value.

Claims 4 – 7 (cancelled).

Claim 8 (currently amended): A method of automatically controlling a load lock that facilitates transfer of parts between a room at ambient atmospheric pressure and a vacuum transfer or processing chamber maintained at a pressure less than one torr and that has an evacuatable load lock chamber, an exterior door positioned between the load lock chamber and the room, a interior door positioned between the load lock chamber and the processing chamber, a exterior door actuator that is responsive to an exterior door control signal to open or close the exterior door, an interior door actuator that is responsive to an interior door control signal to open or close the interior door, and a vacuum pump connected to the load lock chamber for evacuating the load lock chamber, comprising:

connecting a modular differential and absolute pressure transducer, which includes both a pirani pressure sensor that is capable of measuring absolute pressure at least in a range of 100 torr to 10^{-4} torr and a differential pressure sensor in fluid flow relation to a manifold ~~and mounting the pirani pressure sensor, the differential pressure sensor, and~~ as well as a control circuit in a housing, via one fluid flow connection of the manifold to ~~provide a modular pressure transducer that senses and transduces~~ the load lock chamber to expose both said pirani pressure sensor and said differential pressure sensor to pressure in the load lock chamber via said one fluid flow connection so that said modular differential and absolute pressure transducer senses and transduces absolute pressure in the load lock chamber ~~manifold~~ to a voltage that is indicative of the absolute pressure in the ~~manifold~~ load lock chamber and ~~that~~ senses and transduces differential pressure between the ~~manifold~~ load lock chamber and the ambient atmosphere to a voltage that is indicative of the differential pressure between the ~~manifold~~ load lock chamber and the ambient atmosphere, ~~and that~~ whereby said modular differential and absolute pressure transducer also outputs the interior door control signal when the voltage that is indicative of the absolute

pressure equals an interior door control reference voltage and outputs the exterior door control signal when the voltage that is indicative of the differential pressure equals an exterior door control reference voltage;

setting the interior door control reference voltage of the modular differential and absolute pressure transducer to a level that equals the voltage that is indicative of the absolute pressure in the load lock chamber when the load lock chamber is evacuated to a pressure at which ~~opening of~~ the interior door ~~does not cause undesirable rush of gas molecules and particulate impurities and water vapor from the load lock chamber into the transfer or processing chamber~~ is to be opened;

setting the exterior door control reference voltage of the modular differential and absolute pressure transducer to a level that equals the voltage that is indicative of the differential pressure between the load lock chamber and the ambient atmosphere at which ~~opening of~~ the exterior door ~~does not cause undesirable rush of air or gas molecules either into or out of the load lock chamber~~ is to be opened;

~~connecting the manifold of the pressure transducer in fluid flow relation to the load lock chamber so that the pressure in the manifold is the same as the pressure in the load lock chamber;~~

connecting an interior door control link between the modular differential and absolute pressure transducer and the interior door actuator and connecting an exterior door control link between the modular differential and absolute pressure transducer and the exterior door actuator; and

powering the circuitry in the modular differential and absolute pressure transducer to produce the interior door control signal and the exterior door control signal in sequence as the load lock chamber is evacuated and then re-filled with gas such that the modular differential and absolute pressure transducer: (i) provides the interior door control signal to the interior door actuator via the interior door control link to open the interior door when the load lock chamber has been evacuated to a pressure that is low enough so that ~~such opening of the interior door does not cause~~

~~undesirable rush of gas molecules and particulate impurities and water vapor from the load lock into the transfer or processing chamber~~ the voltage that is indicative of the absolute pressure equals the interior door control reference voltage; and (ii) provides the exterior door control signal to the exterior door actuator via the exterior door control link to open the exterior door when the load lock chamber has been re-filled with gas to return the pressure in the load lock chamber to a pressure at which ~~opening of the exterior door does not cause undesirable rush of air or gas molecules either into or out of the load lock chamber~~ the voltage that is indicative of the differential pressure equals the exterior door control reference voltage.

Claim 9 (currently amended): A method of automatically controlling a load lock that facilitates transfer of parts between a room at ambient atmospheric pressure and a vacuum transfer or processing chamber maintained at a pressure less than one torr and that has an evacuatable load lock chamber, an exterior door positioned between the load lock chamber and the room, a interior door positioned between the load lock chamber and the transfer or processing chamber, a exterior door actuator that is responsive to an exterior door control signal to open or close the exterior door, an interior door actuator that is responsive to an interior door control signal to open or close the interior door, a vacuum pump connected to the load lock chamber for evacuating the load lock chamber, and a throttle valve, which slows down effective vacuum pumping speed ~~to reduce turbulence that stirs up particles and contaminants until the pressure in the load lock is pumped down to an intermediate pressure where enough of the air or gases in the load lock are removed so that turbulence does not stir up such particles and contaminants~~ and which is responsive to a throttle valve signal to then step up the vacuum pumping speed, comprising:

connecting a modular differential and absolute pressure transducer in fluid flow relation to the load lock chamber~~, wherein the pressure transducer includes a~~ via one fluid flow connection so that a pirani sensor and a differential pressure sensor in the modular differential and absolute pressure transducer are both in fluid flow relation to

said load lock chamber via said one connection, whereby said pirani sensor ~~that~~ in the modular differential and absolute pressure transducer is capable of sensing ~~both~~ absolute pressure in the load lock chamber at ~~tleast~~ least in a range of 100 torr to 10^{-4} torr and ~~a~~ said differential pressure sensor ~~that~~ in the modular differential and absolute pressure transducer is capable of sensing a differential pressure between the load lock chamber and ambient atmospheric pressure, and wherein the modular differential and absolute pressure transducer also has circuitry connected to the pirani sensor and to the differential pressure sensor that is capable of transducing both the absolute pressure sensed by the pirani sensor and the differential pressure sensed by the differential pressure sensor to electric signals indicative of said absolute and differential pressures as well as of outputting: (i) the throttle valve signal at a settable intermediate absolute pressure set point; (ii) the interior door control signal at a settable low absolute pressure set point; and (iii) the exterior door control signal at a settable differential pressure setpoint;

setting ~~a desired~~said intermediate absolute pressure set point at an intermediate absolute pressure value ~~at which to open the throttle valve to step up the vacuum pumping speed after the pressure in the load lock chamber is pumped down enough so that turbulence does not stir up the particles and contaminants~~ less than 100 torr at which to actuate the throttle valve to increase the vacuum pumping speed, setting a ~~desired~~said low absolute pressure set point at a low absolute pressure value ~~at which the interior door can be opened to allow transfer of parts between the load lock and the transfer or processing chamber without undesirable rush of gas molecules and particulate impurities and water vapor into the transfer or processing chamber~~less than said intermediate absolute pressure value to cause the interior door to be opened, and setting ~~a desired~~said differential pressure set point for a differential pressure value at which to open the exterior door ~~without undesirable flow of air or gas either into or out of the load lock chamber~~;

sensing the actual absolute pressure in the load lock chamber with the modular pressure transducer at least in the range from 100 torr down to ~~the desired~~ said low absolute pressure value;

using the modular differential and absolute pressure transducer to compare the actual absolute pressure in the load lock chamber to ~~the desired~~said intermediate absolute pressure ~~value~~ set point in the modular differential and absolute pressure transducer ~~at which the throttle valve can be opened to step up the vacuum pumping speed after the pressure in the load lock chamber is pumped down enough so that turbulence does not stir up the particles and contaminants~~, and, when the actual absolute pressure in the load lock chamber equals ~~the desired~~said intermediate absolute pressure ~~value~~set point, producing the throttle valve signal with the modular differential and absolute pressure transducer and delivering said throttle valve signal to the throttle valve to step up the vacuum pumping speed;

using the modular differential and absolute pressure transducer to compare the actual absolute pressure in the load lock chamber to ~~the desired~~said low absolute pressure ~~value~~ set point in the modular differential and absolute pressure transducer ~~at which the interior door can be opened without undesirable rush of gas molecules and particulate impurities and water vapor into the transfer of processing chamber~~, and, when the actual absolute pressure in the load lock chamber equals ~~the desired~~said low absolute pressure ~~value~~set point, producing the interior door control signal with the modular differential and absolute pressure transducer and delivering the interior door control signal to the interior door actuator to cause the interior door to open;

sensing the actual differential pressure between the ambient pressure in the room and the pressure in the load lock chamber with the modular differential and absolute pressure transducer; and

using the modular differential and absolute pressure transducer to compare the actual differential pressure to the ~~predetermined~~ differential pressure ~~value~~set point, and, when the actual differential pressure equals the ~~predetermined~~ differential

pressure ~~value~~set point, producing the exterior door control signal with the modular differential and absolute pressure transducer and delivering the exterior door control signal to the exterior door actuator to cause the exterior door to open.

Claim 10 (currently amended): The method of claim 9, wherein the transfer or processing chamber is maintained at less than 10^{-3} torr and the ~~desired~~ low absolute pressure ~~value~~ set point at which the interior door can be opened ~~without undesirable rush of gas molecules and particulate impurities and water vapor into the transfer or processing chamber~~ is set at less than 10^{-3} torr, and including sensing the actual absolute pressure in the load lock chamber with the modular differential and absolute pressure transducer at levels at least from 100 torr to less than 10^{-3} torr.

Claim 11 (currently amended): A method of providing control signals to a load lock that has an interior door between the load lock and a transfer or processing chamber and that has an interior door actuator that responds to an interior door control ~~signals~~ signal to open the interior door, a vacuum pump for evacuating the load lock, a throttle valve that slows the vacuum pump-down speed and that responds to a throttle valve control signal to step up the pump-down speed, and an exterior door for opening and closing the load lock to the ambient atmosphere and that responds to an exterior door control signal to open the exterior door, comprising:

connecting a pirani pressure sensor and a differential pressure sensor in fluid flow relation to a manifold and mounting the ~~regular~~ pirani pressure sensor and the differential pressure sensor together with a control circuit in a housing to provide a modular pressure transducer that: (i) connects both the pirani pressure sensor and the differential pressure sensor in fluid flow relation to the load lock chamber via one connector; (ii) senses and transduces absolute pressure in the manifold to a voltage that is indicative of the absolute pressure in the manifold ~~and~~ ; (iii) that senses and transduces differential pressure between the manifold and the ambient atmosphere to

a voltage that is indicative of the differential pressure between the manifold and the ambient atmosphere~~,~~; and ~~that also~~(iv) outputs the throttle valve control signal when the voltage that is indicative of absolute pressure equals a throttle valve control reference voltage, outputs the interior door control signal when the voltage that is indicative of the absolute pressure equals an interior door control reference voltage, and outputs the exterior door control signal when the voltage that is indicative of the differential pressure equals an exterior door control reference voltage;

setting the throttle valve control reference voltage of the modular pressure transducer to a level that equals the voltage that is indicative of the absolute pressure in the load lock when the load lock is evacuated to a intermediate pressure ~~threshold~~ at which ~~enough of the air or gases in the load lock are removed so that particles and contaminants in the load lock are not stirred up by turbulence at~~ the stepped up pump-down speed is to be actuated;

setting the interior door control reference voltage of the modular pressure transducer to a level that equals the voltage that is indicative of the absolute pressure in the load lock when the load lock is evacuated to a low pressure at which opening of the interior door ~~does not cause undesirable rush of gas molecules and particulate impurities and water vapor from the load lock into the transfer or processing chamber~~is to be actuated;

setting the exterior door control reference voltage of the modular pressure transducer to a level that equals the voltage that is indicative of the differential pressure between the load lock and the ambient atmosphere at which opening of the exterior door ~~does not cause undesirable rush of air or gas molecules either into or out of the load lock~~is to be actuated;

connecting the manifold of the pressure transducer in fluid flow relation to the load lock with said one connector so that the pressure in the manifold is the same as the pressure in the load lock;

~~connecting~~ establishing a throttle valve control link between the modular pressure transducer and the throttle valve;

~~connecting~~ establishing an interior door control link between the modular pressure transducer and the interior door actuator;

~~connecting~~ establishing an exterior door control link between the modular pressure transducer and the exterior door actuator; and

powering the modular pressure transducer to produce the throttle valve control signal, the interior door control signal, and the exterior door control signal in sequence as the load lock is evacuated and then re-filled with gas such that the pressure transducer: (i) provides the throttle valve control signal to the throttle valve via the throttle valve control link to step up the pump-down speed when the load lock has been evacuated to said ~~threshold~~ intermediate pressure at which ~~enough of the air or gases in the load lock are removed so that the particles and contaminants in the load lock are not stirred up by turbulence at~~ the stepped up pump-down speed is to be actuated; (ii) provides the interior door control signal to the interior door actuator via the interior door control link to ~~open~~ actuate the opening of the interior door when the load lock has been evacuated to ~~a~~ said low pressure ~~that is low enough so that such~~ at which the opening of the interior door ~~does not cause undesirable rush of gas molecules and particulate impurities and water vapor from the load lock into the transfer or processing chamber~~is to be actuated; and (iii) provides the exterior door control signal to the exterior door actuator via the exterior door control link to ~~open~~ actuate the opening of the exterior door when the load lock has been refilled with gas to return the pressure in the load lock to a pressure at which the opening of the exterior door ~~does not cause undesirable rush of air or gas molecules either into or out of the load lock~~is to be actuated.

Claim 12 (currently amended): The method of claim 11, wherein the low absolute pressure ~~that is low enough so that such~~at which the opening of the interior door ~~does not cause~~

~~undesirable rush of gas molecules and particulate impurities and water vapor from the load lock into the transfer or processing chamber~~is to be actuated is less than 10^{-3} torr and the modular pressure transducer produces the interior door control signal when it senses that absolute pressure.

Claim 13 (currently amended): The method of claim 11, wherein the low absolute pressure ~~that is low enough so that such~~ at which the opening of the interior door ~~does not cause undesirable rush of gas molecules and particulate impurities and water vapor from the load lock into the transfer or processing chamber~~ is to be actuated is in a range between 10^{-3} and 10^{-4} torr, and wherein the modular pressure transducer senses when the load lock is evacuated to such low absolute pressure between 10^{-3} and 10^{-4} torr to produce the interior door control signal at that low absolute pressure.

Claim 14 (currently amended): The method of claim 11, wherein the low absolute pressure ~~that is low enough so that such~~at which the opening of the interior door ~~does not cause undesirable rush of gas molecules and particulate impurities and water vapor from the load lock into the transfer or processing chamber~~is to be actuated is at least as low as 10^{-4} torr, and wherein the modular pressure transducer senses when the load lock is evacuated to at least as low as 10^{-4} torr to produce the interior door control signal at that low absolute pressure.

Claim 15 (previously presented): The method of claim 11, including routing the throttle valve control signal, the interior door control signal, and the exterior door control signal to the throttle valve control link, to the interior door control link, and to the exterior door control link, respectively, through a common connector on the housing, and connecting the throttle valve control link, the interior door control link, and the exterior door control link to the common connector.

Claim 16 (previously presented): The method of claim 8, including routing the interior door control signal and the exterior door control signal to the interior door control link and to the exterior control link, respectively, through a common connector on the housing, and connecting the interior door control link and the exterior door control link to the common connector.

Claim 17 (currently amended): The method of claim 8, wherein the load lock has a throttle valve that slows the vacuum pump-down speed and that responds to a throttle valve control signal to step up the pump-down speed, and wherein the modular pressure transducer also outputs the throttle valve control signal when the voltage that is indicative of absolute pressure in the manifold equals a throttle valve reference voltage, and further including setting the throttle valve control reference voltage of the modular pressure transducer to a level that equals the voltage that is indicative of the absolute pressure in the load lock chamber when the load lock chamber is evacuated to ~~a~~ an intermediate pressure ~~threshold~~ at which ~~enough of the air or gases in the load lock are removed so that particles and contaminants in the load lock are not stirred up by turbulence at~~ the stepped up pump-down speed is to be actuated, and thereby producing the throttle valve control signal with the powered modular pressure transducer to step up the pump-down speed when the load lock chamber is evacuated to ~~a~~ said intermediate pressure ~~threshold at which enough of the air or gases in the load lock are removed so that particles and contaminants in the load lock are not stirred up by turbulence at the stepped up pump-down speed~~.

Claim 18 (previously presented): The method of claim 8, wherein the pirani sensor is a regular pirani sensor.

Claim 19 (new): A method of automatically controlling a load lock that facilitates transfer of parts between a room at ambient atmospheric pressure and a vacuum transfer or processing

chamber maintained at a pressure less than one torr and that has an evacuatable load lock chamber, an exterior door positioned between the load lock chamber and the room, a interior door positioned between the load lock chamber and the transfer or processing chamber, a exterior door actuator that is responsive to an exterior door control signal to cause the exterior door to open, an interior door actuator that is responsive to an interior door control signal to cause the interior door to open, and a vacuum pump connected to the load lock chamber for evacuating the load lock chamber, comprising:

connecting a modular differential and absolute pressure transducer, which has both an absolute pressure sensor and a differential pressure sensor in fluid flow relation to each other, in fluid flow relation to the load lock chamber via one connection to provide a modular differential and absolute pressure transducer, which also includes circuitry in a housing, that senses and transduces absolute pressure in the load lock chamber to a voltage which is indicative of the absolute pressure and that senses and transduces differential pressure between the pressure in the transducer and the ambient atmosphere to a voltage which is indicative of the differential pressure, and that also outputs said interior door control signal when the voltage which is indicative of the absolute pressure in the load lock chamber equals an interior door control reference voltage and outputs said exterior door control signal when the voltage which is indicative of the differential pressure in the load lock chamber and the ambient atmosphere equals an exterior door control reference voltage;

setting the interior door control reference voltage of the modular differential and absolute pressure transducer to a level that equals the voltage that is indicative of the absolute pressure in the load lock chamber when the load lock chamber is evacuated to a pressure at which the interior door is to be opened;

setting the exterior door control reference voltage of the modular differential and absolute pressure transducer to a level that equals the voltage that is indicative of

the differential pressure between the load lock chamber and the ambient atmosphere at which the exterior door is to be opened;

establishing an interior door control link between the modular differential and absolute pressure transducer and the interior door actuator, and establishing an exterior door control link between the modular differential and absolute pressure transducer and the exterior door actuator; and

powering the modular pressure differential and absolute transducer circuitry to produce said interior door control signal and said exterior door control signal in sequence as the load lock chamber is evacuated and then re-filled with gas such that the modular differential and absolute pressure transducer: (i) provides said interior door control signal to the interior door actuator via the interior door control link to open the interior door when the load lock chamber has been evacuated to a pressure that is low enough so that the voltage that is indicative of the absolute pressure equals the interior door control reference voltage; and (ii) provides said exterior door control signal to the exterior door actuator via the exterior door control link to open the exterior door when the load lock chamber has been re-filled with enough gas to return the pressure in the load lock chamber to a pressure at which the voltage that is indicative of the differential pressure equals the exterior door control reference voltage.

Claim 20 (new): A method of automatically controlling a load lock that facilitates transfer of parts between a room at ambient atmospheric pressure and a vacuum transfer or processing chamber maintained at a pressure less than one torr and that has an evacuatable load lock chamber, an exterior door positioned between the load lock chamber and the room, a interior door positioned between the load lock chamber and the transfer or processing chamber, a exterior door actuator that is responsive to an exterior door control signal to cause the exterior door to open, an interior door actuator that is responsive to an interior door control

signal to cause the interior door to open, and a vacuum pump connected to the load lock chamber for evacuating the load lock chamber, comprising:

connecting a modular differential and absolute pressure transducer in fluid flow relation to the load lock chamber via a single fluid flow connection, wherein the modular differential and absolute pressure transducer includes both an absolute pressure sensor, which is capable of sensing absolute pressure in the load lock chamber, and a differential pressure sensor, which is capable of sensing a differential pressure between the load lock chamber and ambient atmospheric pressure, whereby both said absolute pressure sensor and said differential pressure sensor are in fluid flow relation to said load lock chamber as a result of said single fluid flow connection of the modular pressure transducer to the load lock chamber, said modular differential and absolute pressure transducer also including control circuitry that is capable of outputting: (i) said interior door control signal at a settable low absolute pressure set point; and (ii) said exterior door control signal at a settable differential pressure set point;

setting a low absolute pressure value in the modular differential and absolute pressure transducer at which the interior door can be opened to allow transfer of parts between the load lock chamber and the transfer or processing chamber;

setting a differential pressure value in the modular differential and absolute pressure transducer at which to open the exterior door;

using the modular differential and absolute pressure transducer to sense both the actual absolute pressure in the load lock chamber and the differential pressure between the load lock chamber and the ambient atmosphere;

using the control circuitry in the modular differential and absolute pressure transducer to compare the actual absolute pressure in the load lock chamber to said low absolute pressure value set in the modular differential and absolute pressure transducer at which the interior door can be opened, and, when the actual absolute pressure in the load lock chamber equals the said low absolute pressure value, to

produce said interior door control signal, and delivering said interior door control signal to the interior door actuator, which thereby causes the interior door to open; and

using the control circuitry in the modular differential and absolute pressure transducer to compare the actual differential pressure to the said differential pressure value at which to open the exterior door, and, when the actual differential pressure equals said differential pressure value, to produce said exterior door control signal, and delivering said exterior door control signal to the exterior door actuator, which thereby causes the exterior door to open.

Claim 21 (new): A method of automatically controlling a load lock that facilitates transfer of parts between a room at ambient atmospheric pressure and a vacuum transfer or processing chamber maintained at a pressure less than one torr and that has an evacuatable load lock chamber, an exterior door positioned between the load lock chamber and the room, a interior door positioned between the load lock chamber and the transfer or processing chamber, a exterior door actuator that is responsive to an exterior door control signal to open or close the exterior door, an interior door actuator that is responsive to an interior door control signal to open or close the interior door, a vacuum pump connected to the load lock chamber for evacuating the load lock chamber, and a throttle, which slows down effective vacuum pumping speed to reduce turbulence that stirs up particles and contaminants until the pressure in the load lock is pumped down to an intermediate pressure where enough of the air or gases in the load lock are removed so that turbulence does not stir up such particles and contaminants and which is responsive to a throttle signal to then step up the vacuum pumping speed, comprising:

controlling the throttle, the interior door actuator, and the exterior door actuator with a modular differential and absolute pressure transducer that has one, but not more than one, absolute pressure sensor and one, but not more than one, differential pressure sensor, and which is connected to the load lock chamber via a single fluid

flow connection in a manner that exposes both the absolute pressure sensor and the differential pressure sensor in the modular differential and absolute pressure transducer to pressure in the load lock chamber via said single fluid flow connection to the load lock chamber, said modular differential and absolute pressure transducer also including circuitry that is capable of producing all of the following: (i) said throttle control signal at a settable first absolute pressure set point; (ii) said interior door control signal at a settable second absolute pressure set point; and (iii) said exterior door control signal at a settable differential pressure setpoint;

setting the first absolute pressure setpoint in the modular differential and absolute pressure transducer;

setting the second absolute pressure setpoint in the modular differential and absolute pressure transducer;

setting the differential pressure setpoint in the modular differential and absolute pressure transducer;

operating the vacuum pump to evacuate the load lock chamber;

sensing the pressure in the load lock chamber with the modular differential and absolute pressure transducer while the load lock chamber is being evacuated, whereupon reaching the first absolute pressure setpoint, the modular differential and absolute pressure transducer produces said throttle control signal, and whereupon reaching the second absolute pressure setpoint, the modular differential and absolute pressure transducer produces said interior door control signal; and

refilling the load lock chamber and thereby increasing the pressure in the loadlock chamber while sensing the differential pressure between the load lock chamber and the ambient atmosphere with the modular differential and absolute pressure transducer, whereupon reaching the differential differential and absolute pressure setpoint, the modular pressure transducer produces said exterior door control signal.

Claim 22 (new): A method of automatically controlling a load lock that facilitates transfer of parts between a room at ambient atmospheric pressure and a vacuum transfer or processing chamber maintained at a pressure less than one torr and that has an evacuatable load lock chamber, an exterior door positioned between the load lock chamber and the room, a interior door positioned between the load lock chamber and the transfer or processing chamber, a exterior door actuator that is responsive to an exterior door control signal to open or close the exterior door, an interior door actuator that is responsive to an interior door control signal to open or close the interior door, a vacuum pump connected to the load lock chamber for evacuating the load lock chamber, comprising:

controlling the interior door actuator and the exterior door actuator with a modular differential and absolute pressure transducer that has one, but not more than one, absolute pressure sensor and one, but not more than one, differential pressure sensor, and which is connected to the load lock chamber via a single fluid flow connection in a manner that exposes both the absolute pressure sensor and the differential pressure sensor in the modular differential and absolute pressure transducer to pressure in the load lock chamber via said single connection to the load lock chamber, said modular differential and absolute pressure transducer also including circuitry that is capable of producing said interior door control signal at a settable absolute pressure set point and said exterior door control signal at a settable differential pressure setpoint;

setting the absolute pressure setpoint in the modular differential and absolute pressure transducer;

setting the differential pressure setpoint in the modular differential and absolute pressure transducer;

operating the vacuum pump to evacuate the load lock chamber;

sensing the pressure in the load lock chamber with the modular differential and absolute pressure transducer while the load lock chamber is being evacuated, whereupon reaching said absolute pressure setpoint, the modular differential and absolute pressure transducer produces said interior door control signal; and

refilling the load lock chamber and thereby increasing the pressure in the loadlock chamber while sensing the differential pressure between the load lock chamber and the ambient atmosphere with the modular differential and absolute pressure transducer, whereupon reaching the differential pressure setpoint, the modular differential and absolute pressure transducer produces said exterior door control signal.

Claim 23 (new): A method of automatically controlling a load lock that facilitates transfer of parts between a room at ambient atmospheric pressure and a vacuum transfer or processing chamber maintained at a pressure less than one torr and that has an evacuatable load lock chamber, an exterior door positioned between the load lock chamber and the room, a interior door positioned between the load lock chamber and the transfer or processing chamber, a exterior door actuator that is responsive to an exterior door control signal to open or close the exterior door, an interior door actuator that is responsive to an interior door control signal to open or close the interior door, a vacuum pump connected to the load lock chamber for evacuating the load lock chamber, and a throttle, which slows down effective vacuum pumping speed until the pressure in the load lock is pumped down to an intermediate pressure where enough of the air or gases in the load lock are removed so that turbulence does not stir up such particles and contaminants and which is responsive to a throttle signal to then step up the vacuum pumping speed, comprising:

controlling the throttle and the exterior door actuator with a modular differential and absolute pressure transducer that has one, but not more than one, absolute pressure sensor and one, but not more than one, differential pressure sensor, and which is connected to the load lock chamber with a single fluid flow connection

in a manner that exposes both the absolute pressure sensor and the differential pressure sensor in the modular differential and absolute pressure transducer to pressure in the load lock chamber via said single fluid flow connection to the load lock chamber, said modular differential and absolute pressure transducer also including circuitry that is capable of producing both said throttle control signal at a settable first absolute pressure set point and said exterior door control signal at a settable differential pressure setpoint;

setting the first absolute pressure setpoint in the modular differential and absolute pressure transducer;

setting the differential pressure setpoint in the modular differential and absolute pressure transducer;

operating the vacuum pump to evacuate the load lock chamber;

sensing the pressure in the load lock chamber with the modular differential and absolute pressure transducer while the load lock chamber is being evacuated, whereupon reaching the first absolute pressure setpoint, the modular differential and absolute pressure transducer produces said throttle control signal; and

refilling the load lock chamber and thereby increasing the pressure in the loadlock chamber while sensing the differential pressure between the load lock chamber and the ambient atmosphere with the modular differential and absolute pressure transducer, whereupon reaching the differential pressure setpoint, the modular differential and absolute pressure transducer produces said exterior door control signal.

Claim 24 (new): The method of claim 23, including also controlling the interior door actuator with the modular differential and absolute pressure transducer by setting a second

absolute pressure setpoint in the modular differential and absolute pressure transducer lower than said first absolute pressure setpoint, and continuing to sense the pressure in the load lock chamber with modular differential and absolute pressure transducer as said vacuum pump continues to evacuate the load lock chamber after the first absolute pressure setpoint is reached, whereupon reaching said second absolute pressure setpoint, the modular differential and absolute pressure transducer produces said interior door control signal.

Claim 25 (new): The method of claim 21, wherein the absolute pressure sensor is capable of measuring absolute pressure at least from 100 torr to 10^{-4} torr.

Claim 26 (new): The method of claim 21, wherein the absolute pressure sensor is a pirani sensor.

Claim 27 (new): The method of claim 26, wherein the absolute pressure sensor is a regular pirani sensor.

Claim 28 (new): The method of claim 26, wherein the absolute pressure sensor is a convection pirani sensor.

Claim 29 (new): The method of claim 21, wherein the absolute pressure sensor is a thermocouple sensor.

Claim 30 (new): The method of claim 21, wherein the differential pressure sensor is a capacitance manometer pressure sensor.

Claim 31 (new): The method of claim 21, wherein the differential pressure sensor is a piezo pressure sensor.

Claim 32 (new): A method of automatically controlling a load lock that facilitates transfer of parts between a room at ambient atmospheric pressure and a vacuum transfer or processing chamber maintained at a pressure less than one torr and that has an evacuatable load lock chamber, an exterior door positioned between the load lock chamber and the room, a interior door positioned between the load lock chamber and the transfer or processing chamber, a exterior door actuator that is responsive to an exterior door control signal to open or close the exterior door, an interior door actuator that is responsive to an interior door control signal to open or close the interior door, a vacuum pump connected to the load lock chamber for evacuating the load lock chamber, comprising:

mounting an absolute pressure sensor and a differential pressure sensor along with electric circuitry together in a housing to provide a modular differential and absolute pressure transducer, which is capable of transducing electric signals from the absolute and differential pressure sensors and to produce said interior door control signal and said exterior door control signal at respective absolute pressure and differential pressure setpoints, and making a single fluid flow connection of the modular differential and absolute pressure transducer to the load lock chamber to expose the absolute and differential pressure sensors in the modular differential and absolute pressure transducer to a pressure in the load lock chamber via said single connection;

operating the vacuum pump to evacuate the load lock chamber while sensing the absolute pressure in the load lock chamber with the absolute pressure sensor in said modular differential and absolute pressure transducer so that, upon pumping the pressure in the load lock chamber at least down to the absolute pressure setpoint, the circuitry in the modular differential and absolute pressure transducer produces said interior door control signal to the interior door actuator to cause the interior door to be opened; and

back-filling the load lock chamber with gas to increase the pressure in the load lock chamber while sensing the differential pressure between the load lock chamber and the ambient atmosphere so that, upon back-filling the load lock chamber with at least enough gas to reach said absolute pressure setpoint, the circuitry in the modular differential and absolute pressure transducer produces said exterior door control signal to the exterior door actuator to cause the exterior door to be opened.

Claim 33 (new): A method of automatically controlling a load lock that facilitates transfer of parts between a room at ambient atmospheric pressure and a vacuum transfer or processing chamber maintained at a pressure less than one torr and that has an evacuatable load lock chamber, an exterior door positioned between the load lock chamber and the room, a interior door positioned between the load lock chamber and the transfer or processing chamber, a exterior door actuator that is responsive to an exterior door control signal to open or close the exterior door, an interior door actuator that is responsive to an interior door control signal to open or close the interior door, a vacuum pump connected to the load lock chamber for evacuating the load lock chamber, comprising:

controlling the interior door actuator and the exterior door actuator with a modular differential and absolute pressure transducer that has one, but not more than one, absolute pressure sensor and one, but not more than one, differential pressure sensor, and which is connected to the load lock chamber with a single fluid flow connection in a manner that exposes both the absolute pressure sensor and the differential pressure sensor in the modular differential and absolute pressure transducer to pressure in the load lock chamber via said single connection to the load lock chamber, said modular differential and absolute pressure transducer also including electric circuitry that is capable of producing: (i) said interior door control signal at a absolute pressure setpoint that is set at a absolute pressure value at which the the interior door is to be opened; and (ii) said exterior door control signal at a differential pressure setpoint that is set at a differential pressure value at which the exterior door is to be opened;

sensing the pressure in the load lock chamber with the modular differential and absolute pressure transducer while operating the vacuum pump to evacuate the load lock chamber at least to the absolute pressure setpoint, whereupon the modular differential and absolute pressure transducer produces said interior door control signal to cause said interior door to be opened; and

sensing the differential pressure between the load lock chamber and the ambient atmosphere with the modular differential and absolute pressure transducer while refilling the load lock chamber with gas or air and thereby increasing the pressure in the load lock chamber at least until the differential pressure reaches the differential pressure setpoint, whereupon the modular differential and absolute pressure transducer produces said exterior door control signal to cause said exterior door to be opened.

Claim 34 (new): The method of claim 21, including making said single fluid flow connection to the load lock chamber with a connector that also supports the modular pressure transducer, including both the absolute and differential pressure sensors and the circuitry, on the load lock.

Claim 35 (new): The method of claim 9, wherein the pirani sensor is a regular pirani sensor.

Claim 36 (new): The method of claim 9, including using a manifold to make said one fluid flow connection to the load lock chamber so that the pirani sensor and the differential pressure sensor in the modular pressure transducer are both in fluid flow relation to the load lock chamber.

Claim 37 (new): The method of claim 19, including using a manifold to connect the absolute and differential pressure sensors in the modular differential and absolute pressure transducer in fluid flow relation to each other and in fluid flow relation to the load lock chamber.

Claim 38 (new): The method of claim 19, wherein the absolute pressure sensor is a regular pirani sensor.

Claim 39 (new): The method of claim 38, wherein the absolute pressure sensor is a regular pirani sensor.

Claim 40 (new): The method of claim 38, wherein the absolute pressure sensor is a convection pirani sensor.

Claim 41 (new): The method of claim 19, wherein the absolute pressure sensor is a thermocouple sensor.

Claim 42 (new): The method of claim 19, wherein the differential pressure sensor is a capacitance manometer pressure sensor.

Claim 43 (new): The method of claim 19, wherein the differential pressure sensor is a piezo pressure sensor.

Claim 44 (new): The method of claim 20, including using a manifold to facilitate connecting said modular differential and absolute pressure transducer to the load lock chamber with both

said absolute pressure sensor and said differential pressure sensor in said modular differential and absolute pressure sensor being in fluid flow relation to said manifold.

Claim 45 (new): The method of claim 21, including making said single fluid flow connection to said load lock chamber with a connector that also supports the modular pressure transducer, including both the absolute and differential pressure sensors and the control circuitry, on the load lock.

STATEMENT OF THE SUBSTANCE OF THE INTERVIEW

Applicant appreciates the examiner's time, courtesy, and helpful suggestions in the interview on August 26, 2005. In the August 26, 2005, interview, the applicant presented a draft amended claims listing, including several new draft claims 19-33, for discussion, and the applicant's attorney and the examiner discussed some ways that this patent application could be advanced while maintaining the broader concepts of the invention in the claim coverage. In this regard, the applicant argued that the concept of modularity, i.e., a modular differential and absolute pressure transducer that provides both absolute and differential pressure sensor and transducer functions to produce and output load lock control signals derived from both differential and absolute pressure via only one fluid flow connection to the load lock chamber, is novel and not suggested in the prior art. In this regard, the applicant also explained that the word "manifold" according to a dictionary definition may be too limiting to fully capture this concept. Accordingly, the examiner suggested reciting the modular nature of the invention in claims 9 and 20. Also, the examiner concurred that a "manifold" limitation is not required, but he suggested amending claim 9 to recite the absolute and differential pressure sensors are connected to the load lock via one connector, as the applicant had done in claim 20, to capture that aspect of the modularity without limiting it to a manifold.

The examiner also observed that such recitations in claims as the undesirable rush of gas molecules and particulate impurities may be indefinite and are not necessary limitations for patentability. Therefore, the examiner suggested removing such recitations from the claims. Also, the examiner suggested that the language in the claims should recite that the control signals produced by the modular differential and absolute pressure transducer are the

signals used to actuate the load lock components, e.g., interior door, exterior door, and/or throttle valve. Applicant pointed out that the claim language in this regard is clear by reciting, for example, that the exterior door actuator is responsive to an exterior door control signal and further reciting that the modular differential and absolute pressure transducer produces said exterior door control, thereby being clear that the actuators respond to the signals produced by the modular differential and absolute pressure transducer.

While no agreement was reached on specific amendments that would render the claims allowable, the applicant did agree to incorporate the examiner's suggestions into the claims and to then re-submit them in a Supplemental Amendment.